

## APPENDIX A: WEAPONS OF MASS DESTRUCTION

### Weapons of Mass Destruction 101<sup>44, 45</sup>

The acronym commonly used to describe all of the varieties of weapons of mass destruction is CBRNE, which stands for Chemical, Biological, Radiological, Nuclear, and Explosive. It is important to note that an attack may fall into more than one category (e.g., a bomb laced with chemicals).

#### *Chemical*

Chemical weapons are toxic agents that can be gases, liquids, or solids and may cause injury or death. A chemical attack would result in the rapid onset of symptoms in the people exposed, such as nerve paralysis, choking, or skin blistering, depending on the specific toxin used. The severity of one's reaction is determined by the type of agent, the amount of the agent that is used in the attack, and the duration of exposure.

A chemical agent would most likely be disseminated as an aerosol or gas. It is difficult to disperse a chemical agent into the open air in a concentration that would cause damage because agents often dissipate rapidly and are heavily influenced by weather conditions, such as temperature, and wind speed and direction.

If a chemical agent attack were to occur, authorities would instruct residents either to seek shelter where they are and seal the premises, or to evacuate immediately. There is little assistance that the untrained can offer to the victims of chemical agents, particularly without full respiratory and skin protection.

Two examples of chemical agents that terrorists might use are sarin and mustard gas. Sarin is a colorless, odorless, and tasteless nerve agent compound that can appear in liquid or gas forms. Vaporized sarin, which is the most common form, affects the eyes and the respiratory system. Although antidotes are available, sarin is so lethal that even a small amount can cause death within a few minutes.

Mustard gas was used during World Wars I and II. It has a pungent odor and burns bodily tissues. It can cause skin, eye, and lung problems, which may not appear until several hours after exposure. Being exposed to a large amount or for a prolonged period of time could be life-threatening.

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<sup>44</sup> Public health emergency preparedness and response, accessed at the Centers for Disease Control and Prevention Web site, <http://www.bt.cdc.gov/>

<sup>45</sup> Personal preparedness guide, accessed at the *Washington Post* Web site, <http://www.washingtonpost.com/wp-dyn/health/> (Note: This site provides a great deal of Washington, DC-area specific information, including the bioterrorism sites for local jurisdictions.)

## ***Biological***

Biological warfare involves using bacteria, viruses, or toxins to cause potentially deadly diseases. It can be difficult to use these agents as weapons because many can survive only at certain temperatures or they are hard to create or disperse effectively. Depending on the type, the agent may be aerosolized or made into a powder and distributed through the air or in food or water. For those agents that are transmittable from person to person, terrorists may infect even themselves to purposely infect others.

Biological attacks are different than the other types of attacks described in this section because they may go undetected for days or even weeks. The detection of the event may occur only when people start showing signs of a disease. Once health officials realize that an attack has occurred, people may be asked to get a vaccination, seek treatment, or take steps to prevent infection (e.g., evacuate, shelter-in-place, use masks, wash hands).

Some of the diseases commonly discussed as potential “bioweapons” include anthrax, smallpox, botulism, plague, and tularemia. In the past several years, anthrax and smallpox have been in the forefront in the media. Therefore, this primer provides additional information on botulism and plague.

Botulism is a muscle-paralyzing disease caused by a nerve toxin produced by a bacterium, *Clostridium botulinum*, found naturally in soil. Typically, people who get botulism do so accidentally from food that has been improperly canned, stored, or prepared. However, the bacterium is fairly easy to produce, transport, and use, and it is highly poisonous, which makes it a possible weapon. The toxin may cause a number of neurological symptoms, including blurred or double vision, drooping eyelids, slurred speech, difficulty swallowing, and muscle weakness. These symptoms can occur hours, days, or even up to two weeks after exposure. The symptoms may progress to respiratory failure, paralysis, or death. An antitoxin is available and effective if administered quickly, but recovery can still take many weeks of intensive care.

Plague is an infectious disease that most people associate with the Middle Ages. There are several types of plague. Bubonic plague, the most common form of plague, occurs when an infected flea bites a person. The person develops swollen, tender lymph glands (called buboes), fever, headache, chills, and weakness. Bubonic plague does not spread from person to person. A biological attack would most likely occur through aerosolization of the bacteria. Breathing in these bacteria would cause pneumonic plague, which also can be spread from person to person through the air. With pneumonic plague, the first signs of illness are fever, headache, weakness, and rapidly developing pneumonia with shortness of breath, chest pain, cough, and sometimes bloody or watery sputum. The pneumonia progresses for two to four days and may cause respiratory failure and shock. Without early treatment, infected persons may die.

To reduce the chance of death from plague, antibiotics must be given within 24 hours of first symptoms. Antibiotic treatment for seven days will also protect people who have had direct, close contact with infected persons. Wearing a close-fitting surgical mask also protects against infection.

## ***Radiological and Nuclear***

Although the detonation of a nuclear bomb is a potential terrorism scenario, terrorists are more likely to use what is called a “dirty bomb,” which is a traditional explosive device laced with radioactive material. This is easier to create (materials can be found in industrial areas worldwide), transport, and detonate, than a nuclear weapon. Although radioactive material would be scattered in a small area, most casualties would be due to the explosion, not the radioactivity. The radioactivity probably would be a low dose that might have some health effects on those directly exposed but probably would not kill anyone. It would, however, cause fear, financial hardship, and disruption in the affected area.

A nuclear bomb would cause widespread death and destruction, but it is much less likely to be used, due to the difficulty in acquiring and setting off such a weapon. If advance notice is given, evacuation is the clear choice, but if there is no time to evacuate, the best idea is to shelter-in-place. The three protective elements of a fallout shelter are shielding, distance, and time. Shielding refers to having heavy, dense materials (e.g., concrete) between a potential victim and the fallout particles, and distance refers to having as much distance between the person and the fallout particles as possible (e.g., being in a basement or the center of a large building). Time refers to the fact that radiation disperses fairly quickly, but one may need to stay inside the fallout shelter for days or weeks, depending on the situation.

The extent of radiation contamination depends on a number of factors, including the size of the explosive, the amount and type of radioactive material used, and weather conditions. The symptoms of radiation sickness are widespread and include nausea and vomiting; diarrhea; skin burns and inflammation; weakness; hair loss; and a number of other symptoms. Moderate-to-severe exposures may cause death in a few days to a few weeks if untreated, but health problems due to lesser exposures may take weeks or years to occur. Blood transfusions and bone marrow transplants are possible treatments.

An attack on a nuclear power plant would cause localized problems, but the problems would not be as widespread as those from a nuclear bomb. It could, however, cause radiation sickness and, later, cancers in a local area. Potassium iodine may help to reduce the risk of thyroid cancer in those exposed to certain kinds of radiation, but it will not protect people from all of the effects of such an attack.

## ***Explosive***

An explosive event refers to a bomb or other explosion not connected to radiological or nuclear materials. As was the case on 9/11, a massive explosion can cause widespread death and destruction, but an explosion can also be a small, more contained event.